

Test and Evaluation in Support of International Military Commerce

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**For most international military-related sales,
an “Offset” to the buying nation is required**

**The “Offset” usually required is an agreement
to spend some percentage of the sales value
in the buying nation. Percentage can be as
high as 200% of sales value**



- **U. S. Industry has an Offset Obligation >\$5B**



- **My company currently has offset obligations of \$696M**

Two Types of Offset



Direct: That directly related to the product sold

Indirect: Can be anything of value procured from the buying nation (may require “high tech” content)

Direct Offsets



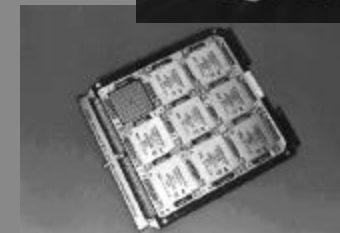
Directly related to product sold

- **Assemblies, sub-assemblies & components**
- **Assembly, test & integration of end items purchased**
- **Again, buying nation must agree**



More advantageous to buying nation

- **Higher tech jobs**
- **New technology introduced**
- **New manufacturing methods introduced**



Direct Offsets



Mixed bag for selling nation

Establish relationships	+
Good proposal helps win	+
Loss of production base	-
Adds to cost	+/-
Qualification risk	-
Potential loss of competitive edge	-

Indirect Offsets



Unrelated to product sold

- Airline tickets**
- Food**
- Component Parts**
- Trading company**

But - buying nation must agree

Has no lasting effects

- No advancement of buying nation technology**
- No advancement of buyer-seller relations**



**There is a Win / Win Outcome
and
You and This Organization
Can Make It Happen!!!**



Qualify buying nation's industry to provide assemblies, subsystems and components for selling nation's products as well

- US Industry Builds 1000 MZIPS for Country B**
- Us Industry Builds 10,000 MZIPS for US DoD**

Great Idea ... But ...



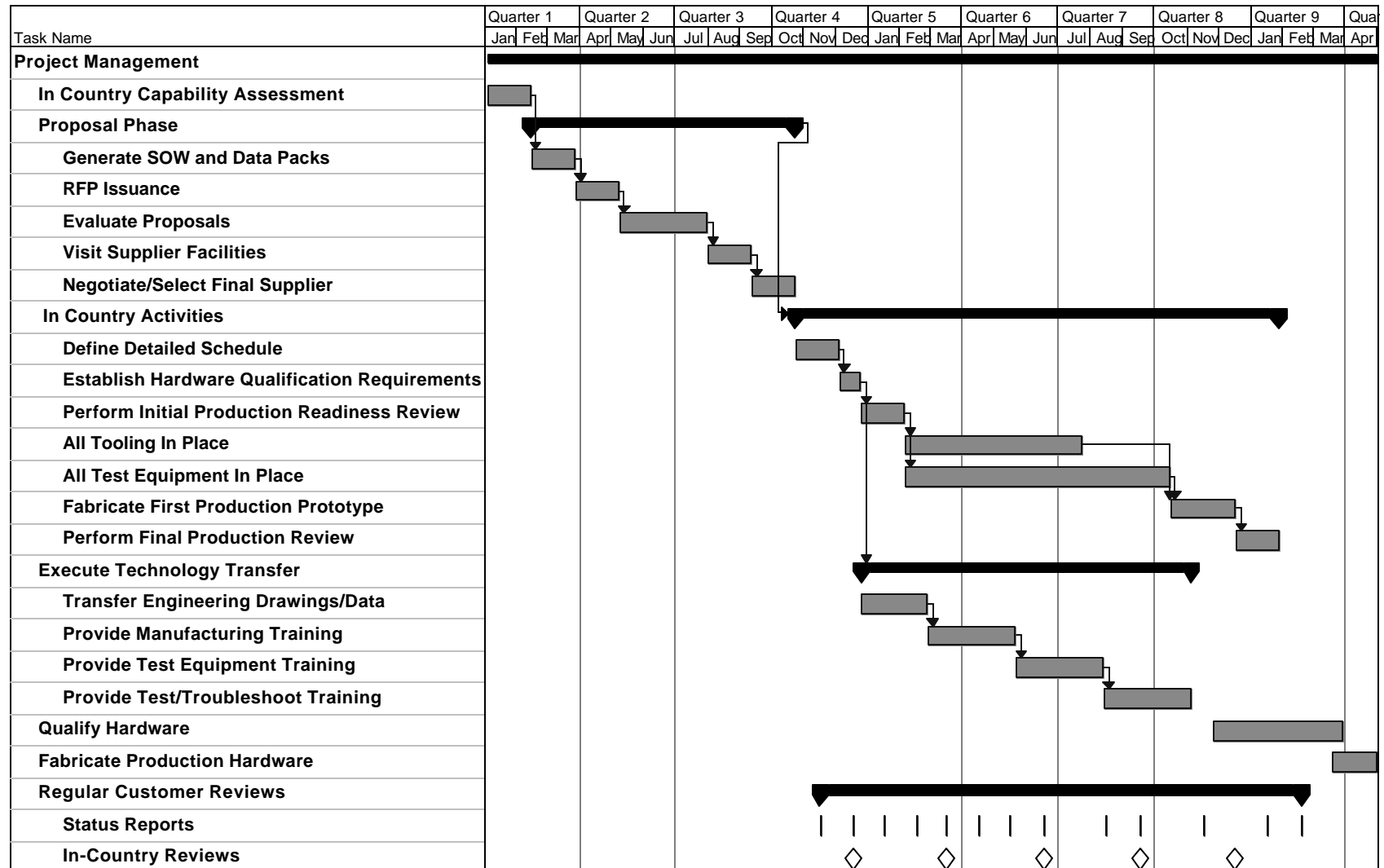
- **Must qualify country B's components to selling nation's standards even if:**
 - **Better design**
 - **Qualified to country B's standards**
- **Costs money and time - and qualification money and time has been spent already**

For Example -



**Qualification to U.S. standards could be
a 2 1/2 year exercise**

Project Flow Process



Technology Transfer



- **Data Package**
 - Obtain appropriate licenses
 - Engineering/Manufacturing drawings
 - Process specifications
 - Develop process for regular updates
 - Define medium for transfer (paper, electronic, microfiche)
- **Establish training program using current production facilities**
 - Manufacturing
 - Test
 - Quality Assurance

Technology Transfer



- **Furnish appropriate Test Equipment**
 - **Unique equipment should be furnished as CFE**
 - **Perform certification and sell-off involving foreign vendor**
 - a) Initial sell-off in your current production facility**
 - b) Repeat sell-off at foreign vendor's facility**
 - **Include maintenance and calibration requirements**
 - **General equipment should be supplied by foreign vendor**
 - **Warranty and service best to be kept local**

Technology Transfer



- **Develop good working relationship within your own facility**
 - **Typical resistance to sharing information with other countries**
 - **Foreign vendors a threat to job security**

Build to Print Manufacturing



- Foreign vendor builds to your Engineering/ Manufacturing Data
- Need for some (limited) flexibility on equivalent material and manufacturing processes
- Requires many levels of training including:
 - a) Procurement from foreign and existing US suppliers of components
 - b) Unique manufacturing processes
 - c) Maintenance and use of Contractor Furnished Equipment (CFE)
 - d) Repair
 - e) Testing
 - f) Troubleshooting
- Require Environmental Stress Screening (ESS) prior to shipping

Build to Specification Manufacturing



- Foreign vendor's design
- Requires lengthy qualification time
- Requires extensive system level testing to quantify performance
- Existing specification may not adequately define key performance parameters
- Require Environmental Stress Screening (ESS) prior to shipping

Qualification Process



- **First piece requirements**
 - **Build using production standard processes and certified material**
 - **Perform first article test**
- **Perform incoming inspection at your facility**
 - **Review from quality standpoint**
 - **Review from manufacturing standpoint**

Qualification Process



- **Test prototype hardware in your facility**
 - **Module level testing**
 - **Sub-assembly level testing**
 - **System level testing**
 - **Test over environments**
- **Field test hardware in prime mission equipment**
 - **Flight test of second source rate sensor for the FCR**
 - **Test firings of missiles containing new suppliers hardware**

Qualification Process



- **Required documentation**
 - **Acceptance Test Plan (ATP)**
 - **Qualification Test Plan (QTP)**
 - **Qualification report**
- **Involve existing facility expertise**
 - **Have original designer help evaluate**
 - **Test in existing production areas**
 - **Get U.S. program concurrence with test and evaluation plans**



What about the Converse?

Qualifying a U.S. design to buyer's satisfaction?

Country “D” Certification & Qualification



- **Based on “Read Across” of existing US Qualification Data - No Country “D” unique testing**
- **“Read Across” to Ministry of Defense Standard**
- **Certification documentation leads to airworthiness clearance**
- **Qualification documentation shows proof-of-compliance to specification**
- **MoD acceptance of F100 Form indicates overall Certification of Design approval**
- **The process is implemented through the concept of Type Records and Subsidiary Type Records**

FCR Certification & Qualification



- **Certification (Airworthiness)**
 - **A Type Record (TR) is completed for the overall helicopter, supported by the following documents:**
 - **Certificates of Design for major system elements (Engine, Air vehicle, Armaments)**
 - **Subsidiary Type Records (STR) for subsystems including FCR**
 - **Lower Level Certifications for major components**
 - **Provides traceability to the data, evidence and information that support certification and contributes to qualification**

FCR Certification & Qualification



- **Qualification (Proof of Compliance)**
 - **Qualification process based on a series of compliance review meetings and Formal Qualification meetings including whole aircraft attributes**
 - **Qualification is based on evidence that supports compliance to build standard (Product specifications)**
 - **Compliance matrix shows verification method for each requirement and identifies supporting evidence**
 - **Evidence submitted via various Engineering, CM, and ILS Data items totaling several thousand pages**

Lessons Learned



- **Expensive Process- 10,000 Hrs excluding ILS over four years**
- **Process required submittal of over 25,000 pages of documentation including U.S. Government letters approving test results and lengthy approval cycles for export authorization and classified release**
- **Changes to baseline required numerous documentation updates and costs associated with hardware and software retrofits**
- **Sensitive design data not released by U.S. Government may require actual flight tests as well**

Qualification of Overseas Vendors and Ourselves Is:



- Tedious at best

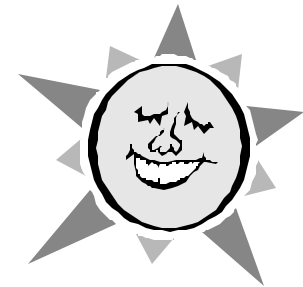


- Excruciating and expensive at worst

But -



- **We are delivering systems and getting paid**
- **We are meeting offset requirements**
- **We have expanded a diminishing supplier base**
- **We have competition/back-up at vendor level**
- **We have a better, less expensive design**
- **We have lasting relationships**
- **We are investigating additional opportunities with our foreign partners**
- **Buying nation has additional high tech jobs**
- **Buying nation has launch customer for new technology**
- **Buying nation has improved manufacturing capability**



How Can We Get These Advantages Quicker, Cheaper, Better?



Through you - the International Congress



**Establishing uniform qualification, test &
evaluation standards throughout the world.**

Enforced By Tough Warranties

A Smaller First Step



Regional Standards - EU, NAFTA, ASEAN,

Then: EU ↔ NAFTA

Then →

In Conclusion



**We can have a simpler path to the
benefits of international sales &
cooperation**

But we testers have to lead the way

Flight Demonstration of Key Performance (Alternate Qualification Approach)



Advantages

**Provides hard end-to-end evidence
that key parameters are being met**

**Reduces and/or eliminates dependence
on dated test results**

Eliminates data release issues

**Eliminates massive paper process
including after-the-fact interpretations**

Drawbacks

**May be dependent on avail-
ability of first production units**

**Requires conditional acceptance
of production deliveries or delay
of production deliveries**

**Depending on scope, may be more
costly than paper qualification**

**Results that conflict with USG
tests could be difficult to resolve**